ANNUAL REPORT FOR 2003

Wiggins Mill Mitigation Site
Wilson County
Project No. 8.1330509
TIP No. R-1030WM

Office of Natural Environment & Roadside Environmental Unit
North Carolina Department of Transportation
December 2003

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SUMMARY

The following report summarizes the monitoring activities at the Wiggins Mill Mitigation Site. This site was constructed in the fall of 2000 to provide wetland mitigation for U-3472 and R-1030. Planting activities were completed in March 2001. The year 2003-year reflects the third complete year that monitoring has taken place on the site.

The daily rainfall data depicted on the gauge data graphs is recorded by an onsite rain gauge installed prior to the 2001-growing season. Additional rainfall data from a rain gauge located in Wilson, NC was provided by the NC State Climate Office and was used to determine the average rainfall range for the site. Based on this data, Wilson experienced an average to above average rainfall year.

The site was monitored using eighteen hydrologic monitoring gauges. In early Spring 2002, four additional gauges were added to the original eighteen. During the 2003 monitoring season, all 22 groundwater-monitoring gauges indicated saturation within 12" of the surface for more than 5% of the growing season, as stated in the mitigation plan.

Eight vegetation plots were established to monitor the 83.7 acres planted in trees on the site. The 2003 vegetation monitoring revealed an average density of 467 trees per acre, with only two of the eight plots not meeting the success criteria. The overall average density is above the minimum success criteria of 320 trees per acre.

A field meeting was conducted in May 2002. A small "head cut" was identified in Thread "A" (the primary stream) near the culvert discharge location adjacent to US 264. Upon agency request, a follow-up meeting was held with the NCDOT Hydraulics Unit to determine the cause and to develop a proposal for remediation. In August 2002, a meeting was held to discuss the NCDOT proposal with the Corps of Engineers and the Division of Water Quality (DWQ). At that time, the DWQ requested a survey of the stream in order to justify the proposal. NCDOT scoped KCI Associates of North Carolina (KCI), the stream/ wetland designer, to survey all of the stream threads, as well as a reference reach on an adjacent property. A Remedial Assessment Report was prepared based on this survey. NCDOT and KCI are currently evaluating the findings. Upon completion, a meeting will be scheduled with the regulatory agencies to reach a consensus on a remediation plan.

The NCDOT proposes that vegetation and hydrology monitoring be continued at the Wiggins Mill Mitigation Site.

1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

The Wiggins Mill Mitigation Site is located in Wilson County, south of the Wiggins Mill Reservoir and southwest of the City of Wilson. It encompasses approximately 89 acres (Figure 1). The site grading was completed in October 2000 and planting in March 2001.

The site serves as mitigation for U-3472 and R-1030. It includes 84 acres of small stream swamp hardwood (1st and 2nd order streams), bottomland hardwood, swamp hardwood, and headwater forest/low elevation seep wetland communities restoration, 5.3 acres of bottomland hardwood enhancement, 7,020 linear feet of stream restoration, and 11.31 acres of buffer restoration.

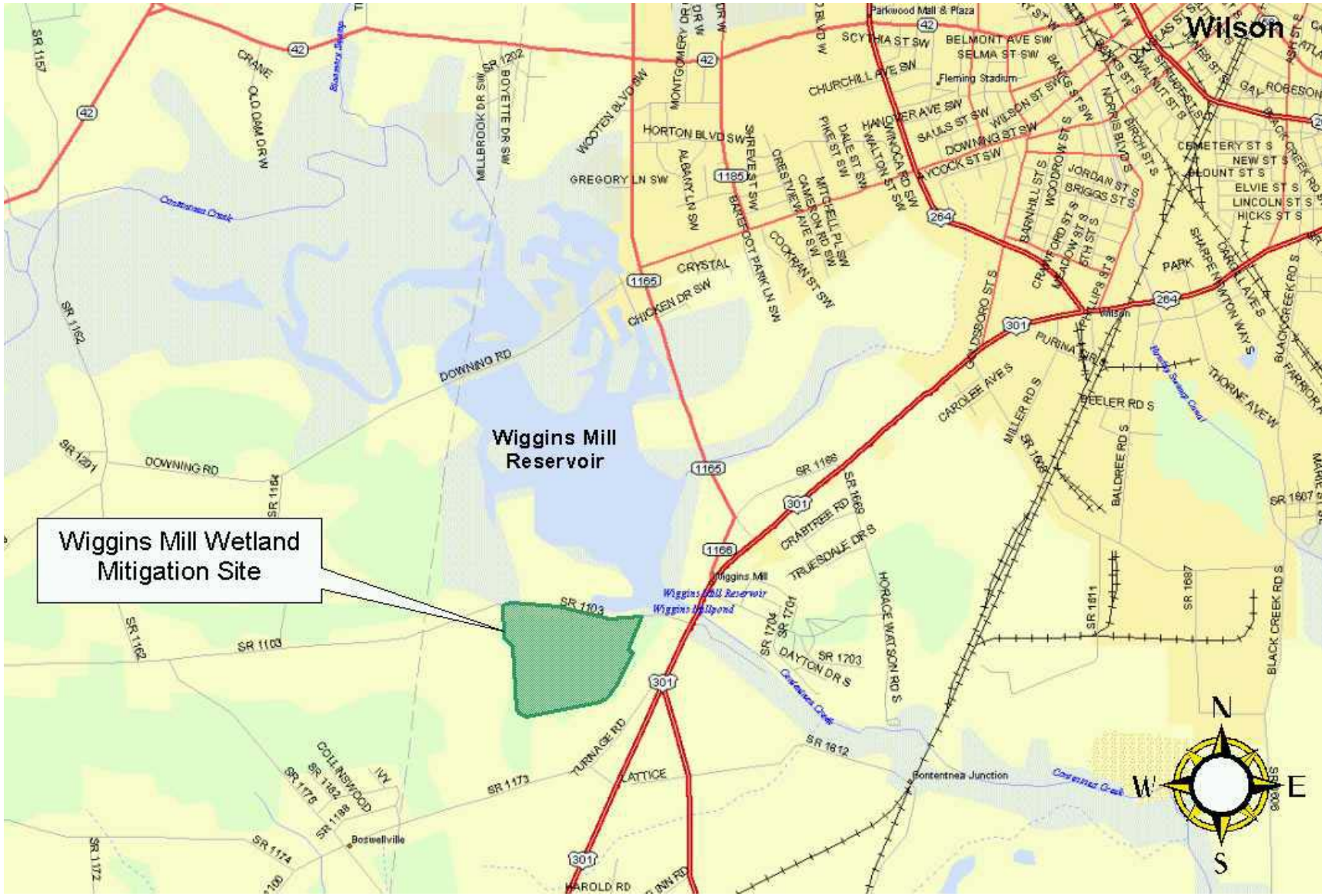
1.2 PURPOSE

In order to demonstrate successful mitigation, hydrologic and vegetative monitoring must be conducted for a minimum of five years or until the site is deemed successful. Success criteria are based on federal guidelines for wetland mitigation. These guidelines stipulate criteria for both hydrologic conditions and vegetation survival. The following report details the results of hydrologic and vegetative monitoring during the 2003-growing season at the Wiggins Mill Mitigation Site. Included in this report are analyses of both hydrologic and vegetative monitoring results, as well as local climate conditions throughout the growing season, and site photographs.

1.3 PROJECT HISTORY

October 2000	Site Grading Completed
February 2001	Herbicide Application
March 2001	Monitoring Gauges Installed
March 2001	Site Planted
March- November 2001	Hydrologic Monitoring (1 yr.)
July 2001	Vegetation Monitoring (1 yr.)
March- November 2002	Hydrologic Monitoring (2 yr.)
June 2002	Vegetation Monitoring (2 yr.)
March- November 2003	Hydrologic Monitoring (3 yr.)
July 2003	Vegetation Monitoring (3 yr.)

Figure 1. Site Location Map



1.4 DEBIT LEDGER

Table 1. Wiggins Mill Mitigation Site Debit Ledger

Site Habitat	Mitigation Plan			TIP Debit	
	Acres at Start	Acres Remaining	% Remaining	U-3472	R-1030
SPH Restoration	45.00	8.44	18.76		36.56
BLH Restoration	39.00	4.52	11.59	0.44	34.04
BLH Enhancement	5.00	5.00	100.00		
Buffer	11.31	6.56	58.00	4.75	
Total	**100.31**	**24.52**	**24.44**		

SPH: Swamp Hardwood BLH: Bottomland Hardwood

2.0 HYDROLOGY

2.1 SUCCESS CRITERIA

In accordance with federal guidelines for wetland mitigation and the wetland mitigation plan (entitled "North Carolina Department of Transportation (NCDOT) Wiggins Mill Mitigation Plan Wilson County, North Carolina", dated February 1, 1999) the success criteria for hydrology states that the area must be inundated or saturated (within 12" of the surface) by surface or groundwater for at least a consecutive 5% of the growing season. This success criteria was agreed upon as part of the special conditions set forth by the Corps of Engineers (COE) through their issuance of permits for NCDOT's TIP projects U-3472 and R-1030.

The growing season in Wilson County begins March 20 and ends November 12. These dates correspond to a 50% probability that temperatures will remain above 28^{o} F or higher after March 20 and before November 12.[1] The growing season is 236 days; therefore, the minimum duration for 5% of the growing season is 12 consecutive days.

2.2 HYDROLOGIC DESCRIPTION

Eighteen monitoring gauges were installed on the site in March 2001 (Figure 2). Four additional groundwater gauges were installed in Spring 2002, (WM-G19, WM-G20, WM-G21, WM-G22). These gauges were installed, based on comments from the agency review meeting, in between marginal gauges and gauges that failed to meet success criteria in 2001.

The automatic monitoring gauges record daily readings of the groundwater depth.

2.3 RESULTS OF HYDROLOGIC MONITORING

2.3.1 Site Data

The maximum number of consecutive days that the groundwater was within twelve inches of the surface was determined for each gauge. This number was converted into a percentage of the 236-day growing season (March 20 – November 12). Table 2 shows the hydrologic results for 2003.

Figure 3 provides a graphical representation of the hydrologic results. Gauges highlighted in blue indicate wetland hydrology for more than 12.5% of the growing season. Gauges highlighted in red show hydrology between 8% and 12.5% of the growing season, while those in green indicate hydrology between 5% and 8%.

[1] Soil Conservation Service, Soil Survey of Wilson County, North Carolina, p.79.

Figure 2. Wiggins Mill Site Gauge Location Map

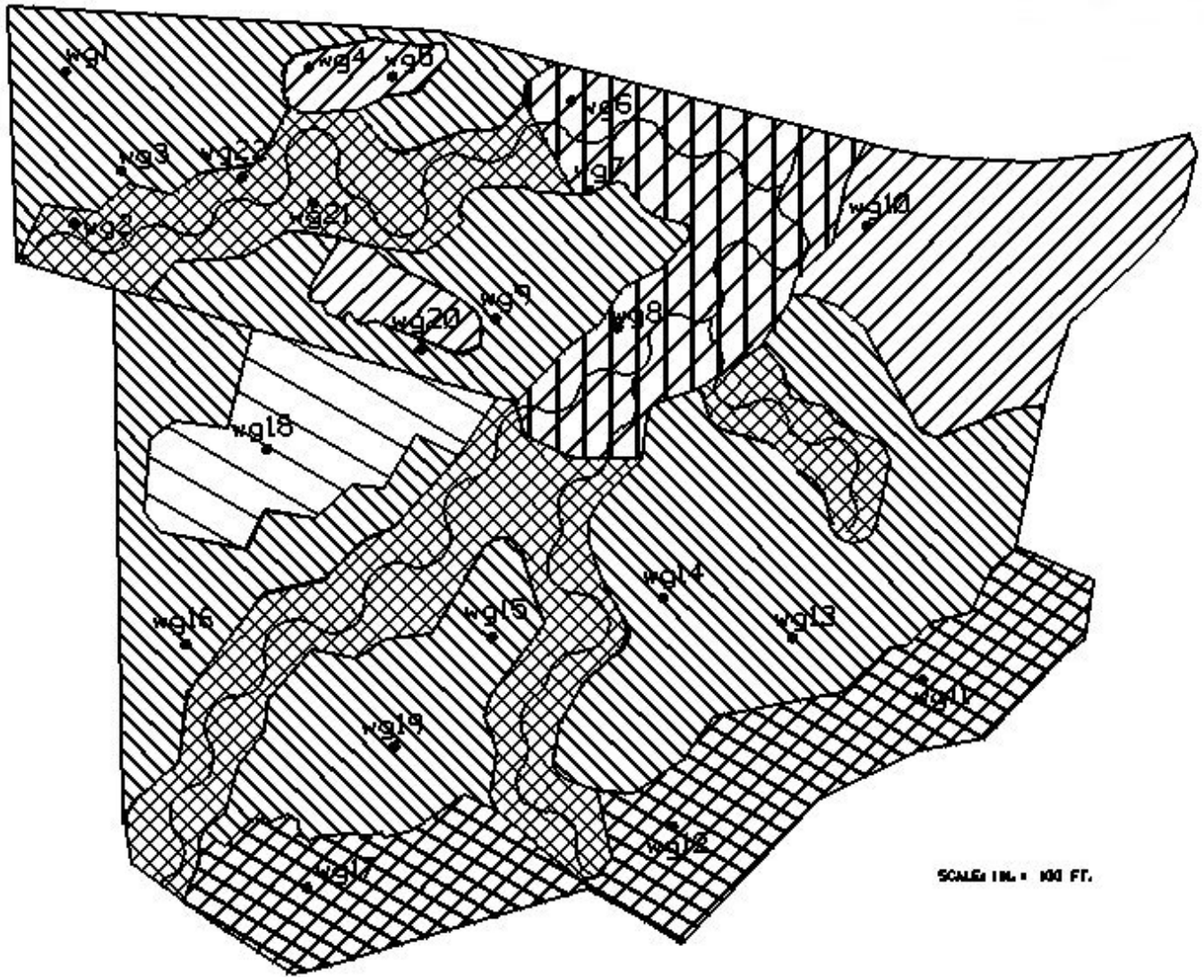


Table 2. 2003 Hydrologic Monitoring Results

Monitoring Gauge	< 5%	5 – 8%	8 – 12%	> 12.5%	Actual %	Success Dates
WM-G1+				✕	19.1	March 21-May 4
WM-G2+			✕		11.9	March 21-April 17
WM-G3+				✕	19.1	March 21-May 4
WM-G4+				✕	22.9	Sept 19- Nov11
WM-G5+				✕	25.4	July 1-August 29
WM-G6+				✕	21.6	March 21-May 10
WM-G7+				✕	19.1	March 21-May 4
WM-G8+				✕	25.8	March 21-May 12
WM-G9+				✕	15.3	May 22-June 26
WM-G10+				✕	22.9	July 25-Sept 16
WM-G11+				✕	100	March 21-Nov 11
WM-G12+				✕	31.8	April 12-June 25
WM-G13+				✕	23.3	March 21-May 14
WM-G14+				✕	22.5	March 21-May 12
WM-G15+				✕	22.5	March 21-May 12
WM-G16+				✕	19.1	March 21-May 4
WM-G17+				✕	100	March 21-Nov 11
WM-G18+				✕	22.5	March 21-May 12
WM-G19+				✕	42.4	March 21- June 28
WM-G20+		✕			6.8	Aug 5-Aug 20
WM-G21+				✕	22.0	March 21-May 11
WM-G22+				✕	22.0	March 21-May 11

+ Gauge met the success criterion during an above average rainfall month (March, April, May, July, August, September, and October).

2.3.2 Climatic Data

Figure 4 is a comparison of monthly rainfall for the period of November 2002 through November 2003 to historical precipitation (collected between 1972 and 2003) for Wilson, North Carolina. This comparison gives an indication of how 2003 relates to historical data in terms of average rainfall. The NC State Climate Office provided all historical data.

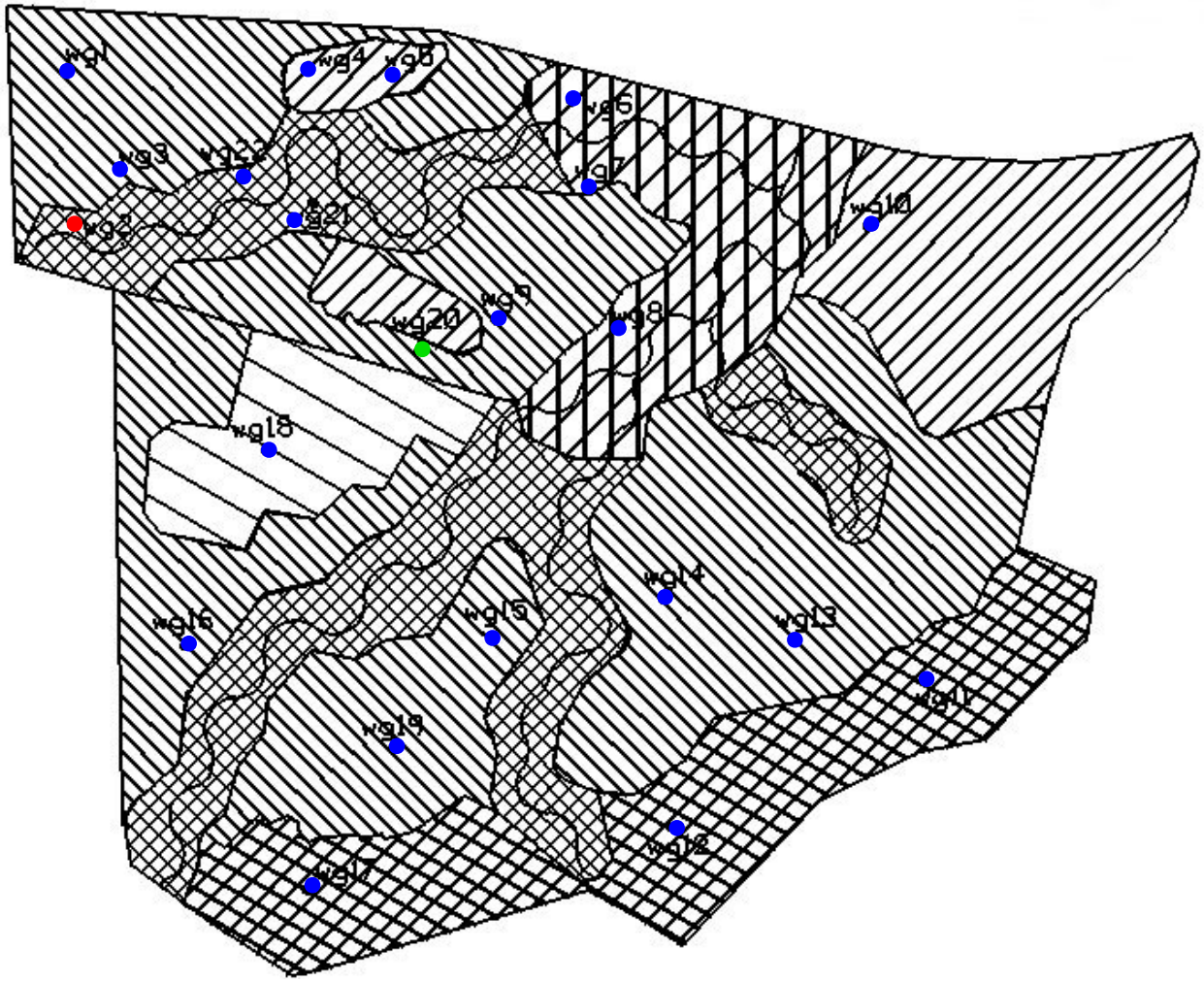


Figure 3. 2003 Hydrologic Monitoring Gauge Results

Hydrology Results

- < 5%
- 5 - 8%
- 8 - 12.5%
- > 12.5%

- Rain Gauge
- Surface Gauge

N

Not to Scale

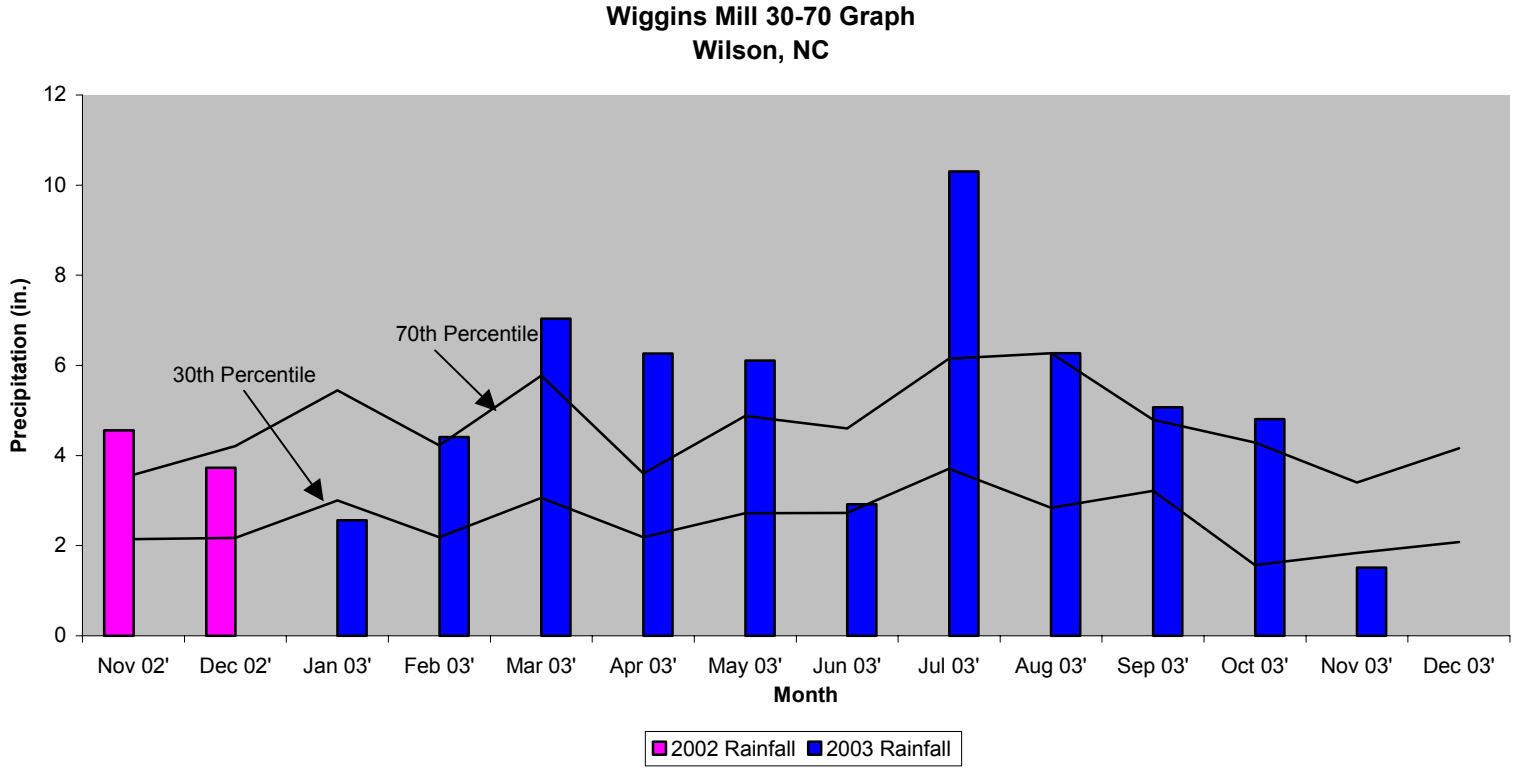


Figure 4. 30-70 Percentile Graph

For the 2003-year, January, June, and November experienced below average rainfall. The months of December (02') and February recorded average rainfall for the site. November (02'), March, April, May, July, August, September, and October experienced above average rainfall. Overall, 2003 experienced an average to above average rainfall year.

2.4 CONCLUSIONS

The 2003-year is the third successful year of hydrologic monitoring on the Wiggins Mill Mitigation Site. All twenty-two groundwater-monitoring gauges met the success criteria and indicated saturation within 12" of the surface for more than 5% of the growing season. Twenty of the twenty-two gauges resulted in saturation for greater than 12.5% of the growing season during an average to above average rainfall year.

3.0 VEGETATION: WIGGINS MILL MITIGATION SITE (YEAR 3 MONITORING)

3.1 SUCCESS CRITERIA

Success criteria states that at least 320 stems per acre must survive after the completion of the third growing season and 240 stems per acre after the fifth growing season. If desired vegetation has not been established, NCDOT will notify the appropriate agencies and will implement corrective measures.

3.2 DESCRIPTION OF SPECIES

The following tree species were planted in the Wetland Restoration Area:

Zone 1: Headwater Forest (12 acres)

Fraxinus pennsylvanica, Green Ash

Quercus laurifolia, Laurel Oak

Betula nigra, River Birch

Nyssa sylvatica var. *biflora*, Swamp Blackgum

Quercus nigra, Water Oak

Quercus phellos, Willow Oak

Zone 2: Bottomland Hardwood (39 acres)

Fraxinus pennsylvanica, Green Ash

Quercus laurifolia, Laurel Oak

Nyssa sylvatica var. *biflora*, Swamp Blackgum

Liriodendron tulipifera, Tulip Poplar

Quercus nigra, Water Oak

Quercus phellos, Willow Oak

Quercus lyrata, Overcup Oak

Zone 3: Swamp Hardwood (10 acres)

Taxodium distichum, Baldcypress

Quercus lyrata, Overcup Oak

Nyssa sylvatica var. *biflora*, Swamp Black Gum

Nyssa aquatica, Water Tupelo

Quercus laurifolia, Laurel Oak

Quercus phellos, Willow Oak

Zone 4: Small Stream Swamp (1st order)

Fraxinus pennsylvanica, Green Ash

Quercus laurifolia, Laurel Oak

Nyssa sylvatica var. *biflora*, Swamp Blackgum

Quercus nigra, Water Oak

Quercus phellos, Willow Oak

Liriodendron tulipifera, Tulip Poplar

Zone 5: Small Stream Swamp (2nd order)

Taxodium distichum, Baldcypress

Quercus lyrata, Overcup Oak

Nyssa sylvatica var. *biflora*, Swamp Blackgum

Fraxinus pennsylvanica, Green Ash

Quercus laurifolia, Laurel Oak

Quercus phellos, Willow Oak

Table 3. Vegetation Monitoring Statistics, By Zone and Plot

ZONE	Plot #	Green Ash	Laurel Oak	River Birch	Swamp Blackgum	Water Oak	Willow Oak	Tulip Poplar	Baldcypress	Overcup Oak	Water Tupelo	Total (3 year)	Total (at planting)	Density (Trees/Acre)
1	10		9		1	3	21	2				36	38	644
	11	6	6		1	4	11					28	32	595
							Zone 1 Average							**620**
2	1	1	1		1		1	7		7		18	36	340
	7		10			5	15					30	41	498
	9	2	3				8	2				15	39	262
							Zone 2 Average							**367**
3	2		2		2		1		6	22	0	33	38	591
	5				7				2			9	42	146
							Zone 3 Average							**369**
4	3	3			8	1	8	9				29	29	680
	8	1	7		12	9	2			1		32	42	518
							Zone 4 Average							**599**
5	4	3	5		1		12			4		25	38	447
	6	8	2		2		10			7		29	48	411
							Zone 5 Average							**429**
							Total Density Average							**467**

Site Notes:

Zone 1: Other species noted: fennel, trumpet creeper, morning glory, horse-nettle, hickory, holly, *Juncus sp*., and pokeberry. 2-4 inches of water in plot 11.

Zone 2: Other species noted: horse-nettle, fennel, bitter sneezeweed, broom sedge, golden rod, *Baccharis sp*., trumpet creeper, swamp chestnut oak, pine, and pokeberry. 2-4 inches of water in plot 9.

Zone 3: Other species noted: horse-nettle, fennel, bitter sneezeweed, pokeberry, trumpet creeper, *Juncus* sp., poison ivy, broom sedge, and winged sumac. Trees planted in areas surrounding Plot 5 appear to have a much higher survival rate than those in Plot 5. Plot 5 does not provide an adequate representation of the survival within Zone 3. 8-10 inches of water in over 75% of plot 5.

Zone 4: Other species noted: Same as above. Plot 3 had various grasses that cover approximately 30% of the plot. Plot 3 also contained volunteer tulip poplar and sweetgum. Channel erosion has formed a new channel in plot 8. One plot post and possibly some trees were washed out.

Zone 5: Baldcypress were noted around plot 4.

3.4 CONCLUSIONS

Of the 89 acres on this site, approximately 83.7 acres involved tree planting. There were 11 vegetation-monitoring plots established throughout the planting areas. The 2003 vegetation monitoring of the site revealed an average density of 467 trees per acre. This average is above the minimum success criteria of 320 trees per acre.

The stream channel was visually monitored during the annual vegetation monitoring of this site. The streambanks were relatively stable with herbaceous vegetation and live stakes in all areas except from Sta. 27+00 to Sta. 39+00 on Thread “A”. The regulatory agencies have been made of aware of the problems in this area and discussion has occurred on what corrections need to be made. Also, multiple trips were made to the site to complete the stream monitoring but due to high water, it was not possible to visually inspect the stream near the retention weir.

NCDOT will continue vegetation monitoring at the Wiggins Mill Mitigation Site.

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

For the third year of hydrology monitoring, all twenty-two groundwater gauges exceeded the success criteria by showing saturation within 12" of the surface for greater than 5% of the growing season (twenty gauges exceeded 12.5%).

The 2003 vegetation monitoring revealed an average density of 467 trees per acre, with only two of the eight plots not meeting the success criteria. The overall average density is above the minimum success criteria of 320 trees per acre.

NCDOT scoped KCI, the stream/ wetland designer, to survey all of the stream threads, as well as a reference reach on an adjacent property. A Remedial Assessment Report was prepared based on this survey. NCDOT and KCI are currently evaluating the findings. Upon completion, a meeting will be scheduled with the regulatory agencies to reach a consensus on a remediation plan.

NCDOT will continue monitoring the Wiggins Mill Mitigation Site for hydrology and vegetation.

APPENDIX A

GAUGE DATA GRAPHS

APPENDIX B

SITE PHOTOS AND
PHOTO AND PLOT LOCATIONS MAP

Wiggins Mill

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

2003

Photo 7

Photo 8

Photo 9

2003

WIGGINS MILL MITIGATION SITE
Planting Zones, Photo Points, and Vegetation Plots

PROJECT REFERENCE NO.	SHEET NO.
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

■ Vegetation Plots

Ⓟ Photo Points

WIGGINS MILL PLANTING COMMUNITY LEGEND

TYPE	SYMBOL
HEADWATER FOREST	
BOTTOMLAND HARDWOOD	
SWAMP HARDWOOD	
SMALL STREAM SWAMP (1ST ORDER)	
SMALL STREAM SWAMP (2ND ORDER)	
BOTTOMLAND HARDWOOD ENHANCEMENT	EXISTING WOODS